

WHAT IS CLAIMED IS:

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- 1 1. A method for printing an image; said method
2 comprising:
3 for at least each colorimetric level that will be
4 found in rendering the image, defining plural different
5 superpixels;
6 generating or receiving data for the image;
7 rendering the image by a process that finds, for
8 positions within the image:
9
10 colorimetric levels, and
11
12 a randomized value corresponding to substan-
13 tially each found colorimetric level;
14
15 applying the randomized value to select a superpixel
16 from the plural superpixels for each found colorimetric
17 level; and
18 printing the image using the selected superpixels.
- 1 2. The method of claim 1, wherein:
2 the superpixels defined for each available colorimet-
3 ric level are all colorimetrically equivalent.
- 1 3. The method of claim 1, wherein:
2 the superpixels defined for at least one colorimetric
3 level vary in colorimetric value so as to express that
4 colorimetric level, on average, as a nonintegral number of
5 colorant quanta.

1 4. The method of claim 1, wherein the rendering step operates in a computational space that has:
2
3 one dimension for each colorant available; plus
4 at least one dummy dimension which generates said
5 randomized value.

1 5. The method of claim 4, wherein:
2 operation of the rendering step in the at least one
3 dummy dimension comprises using at least one least-significant bit that:
4
5
6 results from the rendering step in a colorant
7 dimension, but
8
9 is substantially decorrelated from the colorimetric levels found by the rendering step.
10

1 6. The method of claim 4, wherein:
2 operation of the rendering step in the at least one
3 dummy dimension comprises deriving or maintaining a matrix
4 of randomized values; and
5 the applying step comprises mapping a particular
6 location in the matrix to a particular position in the
7 image, to choose a random value at said particular location in the matrix for selection of a superpixel to use at
8 said particular position in the image.
9

- 1 7. The method of claim 6, wherein:
2 the matrix comprises a set of smaller matrices, each
3 of which contains randomized numbers corresponding to
4 available superpixels; and
5 successive ones of the smaller matrices are progres-
6 sively stepped across the first-mentioned matrix.
- 1 8. The method of claim 4, wherein:
2 the rendering step operates by error diffusion.
- 1 9. The method of claim 1, wherein:
2 the rendering step operates by error diffusion.
- 1 10. The method of claim 1, wherein:
2 the image consists of color values in each of a large
3 multiplicity of pixels;
4 said positions comprise substantially each pixel of
5 the image, at a reduced resolution relative to the print-
6 ing step.

1 11. A method for printing an image; said method
2 comprising:
3 for each available colorimetric level, defining plu-
4 ral different superpixels;
5 generating or receiving data for the image;
6 rendering the image by a process that finds colori-
7 metric levels for positions within the image;
8 deriving or maintaining a matrix of randomized
9 values;
10 mapping a particular location in the matrix to a
11 particular position in the image, to choose a randomized
12 value at said particular location in the matrix for selec-
13 tion of a superpixel to use at said particular position in
14 the image; and
15 printing the image using the selected superpixels.

1 12. The method of claim 11, wherein:
2 the matrix is derived or corrected to possess a blue-
3 noise property of the randomized values.
4

1 13. The method of claim 11, wherein:
2 the mapping step comprises interpreting the value,
3 found at each location in the matrix, as a pointer into a
4 certain dimension of a table of superpixels.

1 14. The method of claim 11, wherein:
2 the mapping step comprises interpreting an input or
3 output colorimetric level, for the particular position in
4 the image, as a pointer into a certain dimension of the
5 table of superpixels.

1 15. The method of claim 11, wherein the mapping step
2 comprises:
3 interpreting the value, found at each location in the
4 matrix, as a pointer into a first dimension of a table of
5 superpixels; and
6 interpreting an input or output colorimetric level,
7 for the particular position in the image, as a pointer
8 into a second dimension of the table of superpixels.

1 16. The method of claim 17, wherein:
2 the mapping step comprises interpreting identifica-
3 tion of a color plane being rendered, as a pointer into a
4 third dimension of the table of superpixels.

1 17. The method of claim 11, wherein:
2 the mapping step comprises using said found random-
3 ized value for control of superpixels in all color planes.

1 18. The method of claim 11, wherein:
2 the matrix comprises a set of smaller matrices, each
3 of which contains randomized numbers corresponding to
4 available superpixels; and
5 successive ones of the smaller matrices are progres-
6 sively stepped across the first-mentioned matrix.

1 19. The method of claim 18, wherein:
2 said stepped smaller matrices also are tiled across
3 the first-mentioned matrix and wrapped around at an edge
4 of the first-mentioned matrix.

1 20. The method of claim 18, wherein:
2 the smaller matrices are all substantially identical.

1 21. The method of claim 18, wherein:
2 the smaller matrices comprise plural different inter-
3 leaved arrays.

1 22. The method of claim 21, wherein:
2 the plural different arrays are different sizes.

1 23. The method of claim 18, wherein:
2 the smaller matrices are one-dimensional matrices.

1 24. The method of claim 11, wherein:
2 the superpixels defined for at least one colorimetric
3 level vary in colorimetric value so as to express that
4 colorimetric level, on average, as a nonintegral number of
5 colorant quanta.

1 25. A method for printing an image; said method compris-
2 ing the steps of:
3 defining, for each available colorimetric level, plu-
4 ral different superpixels;
5 generating or receiving data for the image;
6 rendering the image by a process that finds colori-
7 metric levels for positions within the image;
8 selecting a superpixel from the plural superpixels
9 for the found colorimetric level;
10 controlling the defining or selecting step, or both,
11 to impart a blue-noise property to the selected superpix-
12 els as an aggregate; and
13 printing the image using the selected superpixels.

1 26. The method of claim 25, wherein:
2 the defining step comprises screening the superpixels
3 for spatial-frequency characteristics;
4 whereby spatial frequencies, other than information
5 in the image, appear substantially consistent in the
6 printed image.

1 27. The method of claim 26, wherein:
2 the screening means comprises performing spatial
3 Fourier analysis.

1 28. The method of claim 25, wherein:
2 the superpixels defined for at least one colorimetric
3 level vary in colorimetric value so as to express that
4 colorimetric level, on average, as a nonintegral number of
5 colorant quanta.
6

1 29. Apparatus for printing an image; said apparatus
2 comprising:
3 means for defining plural different superpixels for
4 each available colorimetric level;
5 means for generating or receiving data for the image;
6 means for rendering the image by a process that finds
7 colorimetric levels for positions within the image;
8 means for generating or receiving a randomized value
9 for each of the positions within the image;
10 means for applying the randomized value, in common
11 for all color planes, to select for each color plane a
12 respective superpixel from the plural superpixels for the
13 found colorimetric level; and
14 means for printing the image using the selected
15 superpixels.

1 30. The apparatus of claim 29, wherein:
2 the applying means comprise means for employing a
3 randomized value which corresponds to a compatible set of
4 superpixels for different color planes.

1 31. The apparatus of claim 30, wherein:
2 the compatible set of superpixels comprises coordi-
3 nated placement of colorant quantity in the different col-
4 or planes to achieve a certain image-quality objective.

1 32. The apparatus of claim 31, wherein:
2 said coordinated placement comprises elimination of
3 substantially all drop-on-drop placement across planes,
4 within highlight regions of the image.

1 33. The apparatus of claim 29, wherein:
2 the superpixels defined for at least one colorimetric
3 level vary in colorimetric value so as to express that
4 colorimetric level, on average, as a nonintegral number of
5 colorant quanta.

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